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(54) COILER DRUM FOR HOT METAL STRIP

(71) We, LOEWY ROBERTSON ENGINEERING COMPANY LIMITED, a British company of Wallisdown Road, Poole, Dorset, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates generally to coilers for coiling hot metal strip. Coilers to which the present invention specifically relate are of the type having a drum comprising an elongate core rotatable about its longitudinal axis, a plurality of longitudinally extending segments positioned around the core, a plurality of longitudinally extending spreader bars interposed between adjacent segments with inclined surfaces along the longitudinal edges of the segments engaged by the spreader bars and means for moving the spreader bars towards and away from the longitudinal axis of the core to move the segments towards and away from the core to thereby collapse and expand the drum.

Movement of the spreader bars relative to the core in the direction radially outwards with respect to the longitudinal axis of the core results in an outward movement of the segments. Hot metal strip is wound onto the drum of the coiler with the segments in their expanded position and, after coiling, the strip is removed from the drum after the segments have been collapsed to enable the coil to be withdrawn from off the drum.

It has been found that, due to the heat transfer from the hot strip to the drum of the coiler, differential thermal expansion may take place between the segments and the spreader bars making it difficult to withdraw the spreader bars relative to the segments when the drum is to be collapsed.

It is an object of the present invention to provide a coiler of the type set forth in which this difficulty is overcome.

According to the present invention, in a coiler of the type set forth each spreader bar is provided with at least one longitudinally extending passage for the flow of cooling liquid therethrough.

The provision of means for cooling the spreader bars enables the operating temperature of the bars to be reduced and thus minimise the expansion of the spreader bars and this enables the coiler drum to be contracted after the hot strip has been wound thereon.

It is important that the cooling fluid, usually water, does not come into contact with the metal strip being wound onto the drum, particularly if the strip is aluminium, because this would cause staining of the strip. Accordingly in a preferred embodiment of the invention the cooling fluid is circulated through a closed circuit.

In a preferred arrangement a push rod which is employed to bring about movement of the spreader bars is in the form of a hollow tube located in a bore of the elongate core. The hollow push rod preferably forms part of the closed circuit as does the annular space between the outside of the push rod and the wall of the bore of the core.

In order that the invention may be more readily understood it will now be described, by way of example only, with reference to the drawing filed with the Provisional Specification in which:—

Figure 1 is an axial section through part of a coiler in accordance with the invention; and

Figure 2 is a section, to an enlarged scale, on the line II–II of Figure 1.

A coiler for coiling hot strip metal such as aluminium has a drum 10 for receiving the strip material. The drum has three segments 12a, 12b, and 12c positioned around a hollow core 14 which is rotatable about its longitudinal axis in bearings 15. The bearings 15 are positioned at one end of the drum 10 so that the drum is mounted in cantilever fashion. However in use, a further bearing (not shown) may be used to support the free end of the drum 10.

The periphery of the drum can be expanded and contracted by means of a spreader mechanism comprising an actuating rod 16 located in an axial bore of the core 14 with the rod connected at one end via a flanged member 18 to lifter bars 20a, 20b and 20c of which only the lifter bar 20c is shown. These bars are guided longitudinally in slots formed in the core. Spreader bars 22a, 22b and 22c, of which only the bar 22c is

illustrated, are also guided in the slots and wedge surfaces 24 on the lifter bars contact corresponding wedge surfaces 26 on the underside of the spreader bars. The spreader bars are positioned in interposed relation with the segments and inclined surfaces along the longitudinal edges of the segments are engaged by the spreader bars.

In the arrangement shown in Figure 1 the actuating rod 16 has been displaced to its full extent in the right hand direction and the lifter bars have been displaced axially to lift the spreader bars and hence the segments to increase the diameter of the drum to its maximum value. By displacing the rod 16 in the left hand direction the spreader bars retract radially and the drum is reduced in diameter.

The return of the segments on the collapse of the drum is assisted by a plurality of springs 28 each acting between the bottom of recesses formed in the segment and the underside of the head of bolts 30 secured to the core 14.

In order to bring about cooling of the spreader bars when the coiler is in operation, means are provided for circulating cooling fluid through the spreader bars of the drum. Particularly when aluminium is being coiled on the drum it is essential that the coolant liquid does not come into contact with the aluminium or staining may result and to this end the coolant liquid is circulated through a closd circuit.

The coolant liquid is supplied through a stationary inlet port 17 into the annular space 19 between the outside of the push rod 16 and the adjacent wall of the bore of the core 14. The fluid travels along the axial space axially of the drum until it reaches a plurality of openings 32 formed in the core. These openings are arranged at substantially the same axial position on the drum and beyond the openings there is a bearing seal 34 positioned between the rod and the adjacent surface of the core to close off the annular space. A duct 36 extends along each of the spreader bars in the longitudinal direction thereof close to the outer surface and each duct is in communication with one of the openings 32. At the opposite ends of the duct 36 there are a series of openings 38 which extend to further openings 40 in the wall of the core. From these openings the liquid passes into the space between the rod 16 and the adjacent wall of the core on the left hand side of the seal 34. The liquid then passes through one of a plurality of holes 42 in the wall of the rod 16 into the hollow central passage of the rod. After passing longitudinally of the rod the liquid passes through a plurality of further openings 43 in the wall of the rod and it leaves the coiler through a stationary outlet port 45. In this way cooling liquid, which is usually water, can be circulated through the spreader bars when the coiler drum is in use.

The drive means for rotating the coiler drum and the means for displacing the push rod 16 are conventional and are not shown in the drawings.

As can be seen from Figure 2, the inclined surfaces of the spreader bars which engage with the corresponding surfaces of the segments are recessed along their lengths to receive graphite impregnated iron liners 46. The presence of these liners avoids the need for any other form of lubricant between the engaging surfaces. The openings 38 in the spreader bars are closed at their upper ends by plugs 48.

WHAT WE CLAIM IS:—

1. A coiler of the type set forth, wherein each spreader bar is provided with at least one longitudinally extending passage for the flow of cooling liquid therethrough.

2. A coiler as claimed in claim 1, in which the cooling liquid is circulated through a closed circuit.

3. A coiler as claimed in claim 2, in which the means for moving the spreader bars comprise lifter bars extending longitudinally of the drum with wedge surfaces on the bars engaging corresponding wedge surfaces on the spreader bars and an actuating rod connected to the lifter bars and located in an axial bore of the core and wherein the actuator rod is hollow and its bore forms part of the closed circuit for the cooling liquid.

4. A coiler as claimed in claim 3, in which the space between the outside of the actuator rod and the wall of the bore of the core forms part of the closed circuit for the cooling liquid.

5. A coiler of the type set forth substantially as hereinbefore described with reference to the drawing filed with the provisional specification.

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1531410 PROVISIONAL SPECIFICATION
1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

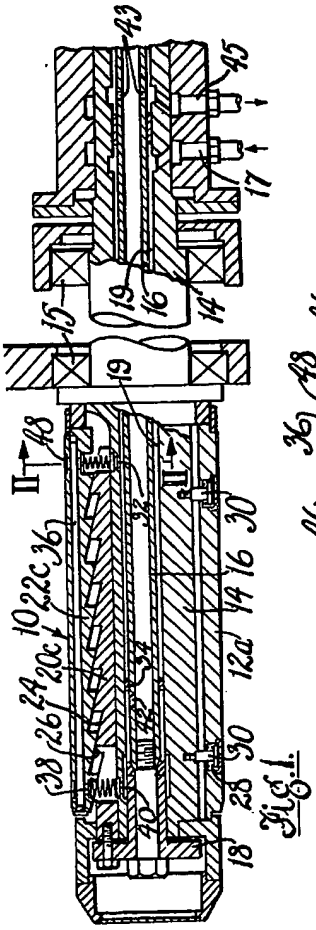

Fig. 1.

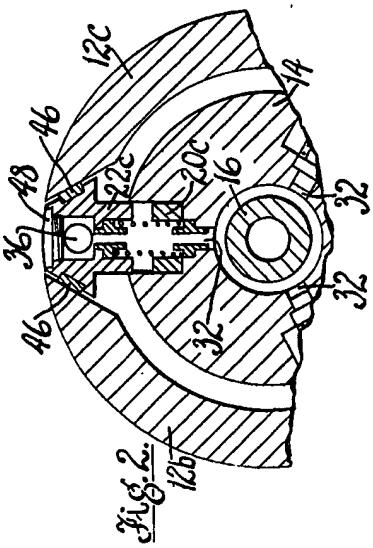

Fig. 2.